CS59–41
Textile-Fabrics, woven; testing and reporting

U. S. DEPARTMENT OF COMMERCE
JESSE H. JONES, Secretary
NATIONAL BUREAU OF STANDARDS
LYMAN J. BRIGGS, Director

WOVEN TEXTILE FABRICS

TESTING AND REPORTING

(THIRD EDITION)

COMMERCIAL STANDARD CS59–41

Supersedes CS59–39

Effective as a Basis for Testing and Reporting From March 28, 1941

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OF THE TRADE

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PROMULGATION

of

COMMERCIAL STANDARD CS59–41

for

WOVEN TEXTILE FABRICS—TESTING AND REPORTING

(Third Edition)

On September 27, 1935, at the instance of the National Retail Dry Goods Association, a general conference of representatives of commercial testing laboratories, manufacturers, distributors, and users of woven dress fabrics adopted a recommended commercial standard covering methods of testing and reporting these commodities, which was subsequently accepted by the trade and promulgated as Commercial Standard CS59–36.

In 1939, on recommendation of the standing committee, and following written acceptance by those concerned, a revision of the standard to keep it abreast of progress was promulgated as CS59–39.

At the joint request of the National Association of Finishers of Textile Fabrics and the American Association of Textile Chemists and Colorists, and with the approval of the standing committee, the standard was again revised during 1940. This revision broadens the scope to cover all woven textile fabrics; additional methods of test; changes in some of the existing methods; and several editorial changes. The revision has since been accepted by the trade for promulgation by the United States Department of Commerce through the National Bureau of Standards.

The standard is effective as a basis for testing and reporting from March 28, 1941.

Promulgation recommended.

I. J. Fairchild,
Chief, Division of Trade Standards.

Promulgated.

Lyman J. Briggs,
Director, National Bureau of Standards.

Promulgation approved.

Jesse H. Jones,
Secretary of Commerce.

WOVEN TEXTILE FABRICS—TESTING AND REPORTING

(Third Edition)

COMMERCIAL STANDARD CS59–41

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I. PURPOSE

1. The purposes are to provide standard methods of testing woven textile fabrics from the standpoint of serviceability and a uniform basis for reporting results of tests, for the guidance of testing laboratories in order to eliminate confusion resulting from a diversity of testing methods. It is expected that comparability and reproducibility of test results will be attained thereby for the benefit of producers, distributors, and users.

II. SCOPE

2. This standard provides methods for testing and reporting the breaking strength; colorfastness to chlorine, cleaning (dry and wet), crocking (rubbing), laundering, light, perspiration, and pressing (dry

and wet); shrinkage in laundering and cleaning (dry and wet); and yarn slippage of woven textile fabrics. The standard is intended primarily for testing and reporting on fabrics represented as having qualities covered by these tests, though it may be applied to fabrics not so represented. The test methods relate to qualities which are of primary importance in some fabrics, but which are not found and are not needed in all types of fabrics.

III. GENERAL REQUIREMENTS

3. *Sampling.*—Normally, tests will be conducted and reports issued for the samples submitted, without reference to the method of sampling or size of lot represented. When samples are to represent given lots, the method of sampling and sizes of the lots represented shall be as agreed upon between the client and the testing laboratory.

4. *Size of sample.*—The sample selected from piece goods for test purposes shall be of sufficient size for the tests required. It is estimated that 2 square yards are required to make all of the tests prescribed herein.

5. *Kinds of tests required.*—Unless otherwise required by the client, the testing laboratory will conduct and report on all test covered herein, in accordance with the following procedures.

6. *Interpretation of colorfastness test results.*

6a. A sample shall be considered acceptable for fastness in any classification when there is no appreciable change in shade and also in questions of wash fastness when there is no appreciable staining of the white sample attached. "Appreciable change" is understood to mean a change which, under good light conditions, is immediately noticeable in comparing the tested sample with the original, or in the case of staining, when the staining is immediately noticeable without comparing the attached sample with an original sample of white bleached goods.

6b. If closer inspection or a change of angle of light is required to make apparent the change in any of the above tests, the change shall not be considered appreciable. Tested samples should be assigned the highest classification for which they qualify, although any sample may be assigned a lower classification than that for which it qualifies.

IV. BREAKING STRENGTH

Breaking strength shall be determined by the *grab method* unless one of the strip methods is specified.

1. GRAB METHOD

7. *Test specimens.*

7a. Ten specimens in the warp direction and 10 specimens in the filling direction shall be cut in such a manner that 2, but not more than 2, test specimens of each set contain the same yarns (warp or filling) and that no specimen is taken nearer the selvage than one-tenth the width of the material. Each test specimen shall be 4 inches wide and not less than 6 inches long in the direction in which the strength is to be determined.

7b. Five specimens in the warp direction and five specimens in the filling direction, of which no two specimens contain the same yarns

shall be used for determining the breaking strength of the material under standard atmospheric conditions, and the remaining specimens for determining the breaking strength of the material in a wet state.

8. *Testing machine.*

8a. A motor-driven pendulum machine or a constant rate-of-load machine shall be used.

8b. The faces of the front members of the jaws shall measure 1 by 1 inch, and the faces of the back members shall measure 1 inch in the direction of the application of the load and 2 inches or more perpendicular to the direction of the application of the load. The jaws shall have smooth, flat faces with edges very slightly rounded to prevent cutting, and they shall be pivoted to take the direction of the load force easily and smoothly.

8c. If a pendulum machine is used, it shall be of such capacity that when the specimen breaks, the angle between the pendulum and the vertical is between 9° and 45°. The jaws through which the load is applied shall move at a uniform rate of $12 \pm \frac{1}{2}$ inches per minute.

9. *Procedure.*

9a. *Standard conditions.*—One set of test specimens, as described in paragraph 7b, is placed in an atmosphere having a relative humidity of 65 percent at 70° F (21° C) for at least 4 hours. A tolerance of ±2 percent is permitted in relative humidity and ±2° F (1.1° C) in temperature. In cases of dispute, tests shall be conducted on test specimens which are in equilibrium with the foregoing standard atmosphere. Material is considered to be in equilibrium when it shows no progressive change in weight.

9b. *Breaking strength—standard conditions.*—The first set of test specimens prepared in accordance with paragraph 9a is tested for breaking strength as outlined in paragraph 9c.

9c. With the distance between the two pairs of jaws of the testing machine adjusted to 3 inches, the test specimen is placed symmetrically in the jaws with the long dimension parallel to and the short dimension at right angles to the direction of the application of the load. Caution shall be exercised to see that the same yarns are clamped by both pairs of jaws. If a specimen slips in the jaws, breaks in the jaws, breaks at the edges of the jaws, or for any reason attributable to faulty operation the results vary markedly from the average for the set, the result is disregarded, another specimen is taken, and the result of its break included in the average.

9d. *Wet breaking strength.*—The second set of test specimens, as described in paragraph 7b, is immersed in water at room temperature for 2 hours, or longer if necessary, in order for the specimens to become thoroughly and completely wet. This action may be assisted by mechanical means or by use of a wetting agent. The specimens are removed, one at a time, and tested immediately for breaking strength in accordance with the method outlined in paragraph 9c. The testing of the specimen shall be completed within 1 minute after its removal from the water.

9e. The breaking strength, standard conditions or wet, in the warp or filling direction is the average of the loads required to break the five specimens cut in that direction.

10. *Reporting breaking strength.*—The warp and filling breaking strengths, standard conditions and wet, shall be reported separately in pounds to the nearest whole number.

2. RAVELED-STRIP METHOD

11. The determination of and reporting breaking strength by this method shall be made in accordance with the directions for the grab method (paragraphs 7 to 10, inclusive) with the following exceptions:

11a. *Test specimens.*—The specimens shall be 1¼ inches in width if there are 50 or more yarns per inch and 1½ inches in width if there are less than 50 yarns per inch. Each specimen shall be raveled to 1 inch in width by taking from each side approximately the same number of yarns.

11b. *Jaws.*—The jaws used on the testing machine shall have faces measuring 1 by 1½ inches or more, the longer dimension being perpendicular to the direction of application of the load.

3. CUT-STRIP METHOD

[This method is applicable to heavily sized or coated fabrics]

12. The determination of and reporting breaking strength by this method shall be made in accordance with the directions for the grab method (paragraphs 7 to 10, inclusive) with the following exceptions:

12a. *Test specimens.*—The specimens shall be cut 1 inch in width unless otherwise specified.

12b. *Jaws.*—The jaws used on the testing machine shall have faces measuring 1 by 1½ inches or more, the longer dimension being perpendicular to the direction of application of the load.

V. COLORFASTNESS TO CHLORINE OF COTTON AND LINEN FABRICS

13. *Test specimens.*—At least two specimens, each at least 2 by 4 inches, are required for these tests.

14. *Procedure.*

14a. *No. 1 test.*—One of the two samples to be tested is saturated with a sodium hypochlorite solution containing 0.01 percent of available chlorine, squeezed immediately to remove the surplus solution, and allowed to lie for 1 hour at a temperature of 70° to 75° F (21.1° to 23.9° C), wrapped in a cloth or placed in a closed vessel. The specimen is then washed with water and treated with a 1-percent solution of sodium hyposulphite at 120° F (48.9° C) to remove the chlorine. The specimen is washed again with water between 70° to 75° F (21.1° to 23.9° C) for 5 minutes and then dried.

14b. *No. 4 test.*—The other specimen is subjected to the same test as outlined in paragraph 14a, except that the sodium hypochlorite solution contains 0.1 percent of available chlorine.

15. *Reporting colorfastness to chlorine of cotton and linen fabrics.*

15a. *Class 1.*—Fabrics which have been subjected to No. 1 test and which show no appreciable change in color shall be reported as having "Class 1 colorfastness to chlorine." Such fabrics may be expected to give satisfactory performance when washing compounds containing a small amount of available chlorine or when small amounts of Javelle water are used in home laundering. This practice should be discouraged, however, as there is no defense against abuse. This classification has been set up for the purpose of indicating where these agents can be employed if necessary with the least danger.

15b. *Class 4.*—Fabrics which have been subjected to No. 4 test and which show no appreciable change in color shall be reported as having "Class 4 colorfastness to chlorine." Such fabrics are considered satisfactory for use in borders, trimmings, colored hems for sheets, or any other materials which by reason of the large expanse of white material in relation to colored fabric would be processed as white work in commercial laundries and so subjected to the action of chlorine.

VI. COLORFASTNESS TO CLEANING, DRY AND WET

[For colorfastness to laundering see sections VIII and IX].

16. *Test specimens.*—At least two test specimens, each 2 by 4 inches, are required for this test. To each of these two test specimens are sewed 1-inch square pieces of white wool, desized cotton, silk, viscose rayon, and acetate rayon fabrics, or a 2- by 4-inch piece of composite test cloth.[1]

17. *Apparatus.*—A Launder-Ometer or similar machine, in which 1-pint preserve jars are held with their bases toward a horizontal shaft 2 inches from the center of rotation and the shaft rotated at a speed of 40 to 45 revolutions per minute, shall be used.

18. *Cleaning procedures.*

18a. *Cleaning, dry, procedure.*—Each specimen is placed in a 1-pint preserve jar containing 100 ml of cleaning solution prepared by mixing together 1,000 parts by volume of Stoddard solvent,[2] 67 parts of dry-cleaning soap,[3] 4 parts of water, and 4 parts of tertiary butyl alcohol. The jars are closed, placed in the machine, and the machine operated for 25 minutes. The solution in the jars is then poured out, any discoloration resulting from the bleeding of the specimen being noted, and 100 ml of fresh Stoddard solvent without soap, alcohol, or water is placed in each jar. The jars are returned to the machine, which is then operated for an additional 10 minutes. The specimens are then removed from the jars and, without squeezing, are laid out on a horizontal surface, such as a muslin-covered frame or screen, and allowed to dry at room temperature. One specimen is pressed according to the method of paragraph 19a or 19b, or, if a pile fabric, steamed in accordance with paragraph 19c. The other specimen is treated further according to the following paragraph.

18b. *Cleaning, wet, procedure.*[4]—The unpressed specimen from the preceding dry-cleaning procedure is placed on a porcelain slab, or piece of slate, and wet with sufficient distilled water at a temperature of 90° to 100° F (32.2° to 37.7° C), containing 1 g of neutral soap per liter, to keep the fabric wetted thoroughly for 15 minutes. The fabric is then rinsed by immersing it in a liter of distilled water at a temperature of 90° to 100° F (32.2° to 37.7° C) for 5 minutes, removed without squeezing, laid out on a horizontal surface, such as a mus-

[1] This cloth consists of a lightweight worsted fabric into which are woven wool, cotton, silk, viscose rayon, and acetate rayon yarns, in the order named. These yarns are woven close together in such a way as to form floats on one side of the fabric approximately ¼ inch long and 1/16 inch wide, and each set of yarns is spaced approximately 1¼ inches apart (center to center). This type of cloth may be obtained from the American Woolen Co., Andover, Mass. (style DD–8370; price, January 1939, $2.37½ per yard, 60-inch width).

[2] The dry-cleaning fluid shall conform to all of the requirements of "Stoddard Solvent, Commercial Standard CS3–40."

[3] The soap shall be made by dissolving 56 grams of caustic potash (KOH) in 100 ml of water. The potassium hydroxide solution shall be poured slowly with constant stirring into a mixture of 340 g of oleic acid and 500 ml of Stoddard solvent, continuing the stirring for 15 to 20 minutes.

[4] This refers to the wet cleaning procedure sometimes necessary in dry cleaning. It does not refer to laundering.

lin-covered frame or screen, and allowed to dry at room temperature. This specimen is pressed according to the method of paragraph 19a or 19b or, if a pile fabric, steamed in accordance with paragraph 19c.

19. *Pressing.*—Either of the two methods outlined below may be used in the pressing of the specimen.

19a. *Hand pressing.*—When most of the solvent has evaporated, the specimen is laid on a padded ironing board. The specimen is covered with a damp muslin press cloth, weighing 4 to 4½ ounces per square yard, previously saturated with water and wrung out so as to retain moisture equal to approximately 75 percent of its dry weight. It is then pressed with a flatiron having a temperature between 275° and 300° F [5] until dry. The specimen is allowed to lie on a smooth, horizontal surface for 1 hour thereafter at room temperature.

19b. *Steam pressing (for all fabrics except pile fabrics).*—When most of the solvent has evaporated, the specimen is laid on a bed of a flat-bed press. The press shall be of a hot-bed or polished metal-top type for flat fabrics, or a cloth-top press for rough crepes. The steam pressure shall be between 65 and 70 pounds. The head of the machine is lowered and held in contact with the fabric. During this period steam is admitted from the buck of the press for a period of from 5 to 10 seconds. The specimen is allowed to lie on a horizontal surface for 1 hour thereafter at room temperature.

19c. *Steaming (for pile fabrics).*—When most of the solvent has evaporated from a pile-fabric test specimen, cleaned according to paragraph 18, the specimen is spread out on a steam board or table [6] on a damp muslin press cloth, weighing 4 to 4½ ounces per square yard, previously saturated with water and wrung out so as to retain moisture equal to approximately 75 percent of its weight. Steam is then turned on and allowed to pass through the pile fabric for 2 minutes. The test piece is then cooled to room temperature and allowed to lie in a smooth horizontal position for 1 hour thereafter.

20. Reporting colorfastness to cleaning, dry.

20a. *Class 0.*—Fabrics which have been subjected to the cleaning, dry, test and which show appreciable change in color or appreciable staining of the white cloths shall be reported as having "Class 0 colorfastness to cleaning, dry." Such fabrics are not considered fast to dry cleaning. Any change in appearance aside from color shall be reported.

20b. *Class A.*—Fabrics which have been subjected to the cleaning, dry, test and which show no appreciable change in color and no appreciable staining of the white cloths shall be reported as having "Class A colorfastness to cleaning, dry." Such fabrics are considered fast to dry cleaning. Any change in appearance aside from color shall be reported.

21. *Reporting colorfastness to cleaning, wet.*

[5] A 5- to 6-pound iron with a 1,000-watt heating unit is recommended in order to avoid large fluctuations in temperature. The temperature of the iron can be determined conveniently with the aid of a calibrated thermocouple, a thermometer inserted in a well in the iron, or alloys melting at approximately 275° and 300° F. It must be remembered in using the second method that there may be considerable lag between the temperature indicated by the thermometer and the actual surface temperature of the iron; and in using the second and third methods, that the iron may be cooled by contact with the cloth. Alloys of tin, lead, and bismuth in the proportions 16:25:16 and 9:8:4 melt at approximately 277° and 298° F, respectively. If small particles of these alloys are placed on the iron, the one alloy will melt and the other will not if the iron temperature is within the required range. Temperature indicators furnished as an integral part of some irons should be calibrated for accuracy.

[6] A steam board or table is a board or table of perforated metal, well padded with cotton or other absorbent material. The perforations are of suitable size and so spaced as to allow an even dispersion of steam through the padding.

21a. *Class 0.*—Fabrics which have been subjected to the cleaning, wet, test and which show appreciable change in color or appreciable staining of the white cloths shall be reported as having "Class 0 colorfastness to cleaning, wet." Such fabrics are not considered fast to cleaning, wet. Any change in appearance other than color shall be reported.

21b. *Class A.*—Fabrics which have been subjected to the cleaning, wet, test and which show no appreciable change in color and no appreciable staining of the white cloths shall be reported as having "Class A colorfastness to cleaning, wet." Such fabrics are considered fast to cleaning, wet. Any change in appearance other than color shall be reported.

VII. COLORFASTNESS TO CROCKING (RUBBING)

22. *Test specimens.*—At least two test specimens, each at least 2 by 5 inches, are required for this test.

23. *Apparatus.*—A Crock Meter [7] or similar machine shall be used, in which a square of bleached, unstarched, 80/80 print cloth,[8] held firmly over a so-called finger ⅝-inch (15-mm) diameter, is slid back and forth over the test specimen, under a constant load of 32 ounces.

24. *Procedure.*

24a. *Dry-cloth test.*—One of the test specimens is attached to the top of the board on which the "finger" rests. The square of bleached, unstarched, 80/80 print cloth is fastened to the "finger"; the "finger" is rested on the test specimen and slid back and forth 10 times, that is, 20 strokes, timed at the approximate rate of 2 strokes per second.

24b. *Wet-cloth test.*—The preceding test is repeated on the other specimen with a dampened [9] piece of the same print cloth.

25. *Reporting colorfastness to crocking (rubbing).*

25a. *Soiled sample.*—If the white test cloth is discolored owing to soil on the test specimen, then the crocking test shall be disregarded unless an original unsoiled specimen of the material can be obtained.

25b. *Class 0.*—Fabrics from which an appreciable discoloration of the white cloth has been obtained in the crocking test and which discoloration does not disappear after scrubbing (rubbing between the hands) for 3 minutes with a 0.5-percent soap solution as outlined in paragraph 28 at 120° F. (48.9° C) shall be reported as having "Class 0 colorfastness to crocking." Such fabrics are not considered fast to crocking, and this crocking is considered objectionable.

25c. *Class B.*—Fabrics from which an appreciable discoloration of the white cloth has been obtained in the crocking test, but which discoloration disappears after scrubbing (rubbing between the hands) for 3 minutes with a 0.5-percent soap solution as outlined in paragraph 28 at 120° F (48.9° C), shall be reported as having "Class B colorfastness to crocking." Such fabrics are considered satisfactorily fast to crocking, and this crocking may be termed nonobjectionable.

25d. *Class A.*—Fabrics from which no appreciable discoloration of the white cloth has been obtained in the crocking test shall be reported

[7] Obtainable from the W. C. Durfee Co., 114 Federal Street, Boston, Mass., or from L. A. Olney, chairman, Research Committee, AATCC, Lowell Textile Institute, Lowell, Mass.

[8] Squares of this cloth cut to size for use in the Crock Meter may be purchased in packages of 100 from L. A. Olney, Lowell Textile Institute, Lowell, Mass.

[9] Specimen wet out thoroughly, squeezed, and then passed through a wringer between two sheets of filter paper.

as having "Class A colorfastness to crocking." Such fabrics are considered fast to crocking.

VIII. COLORFASTNESS TO LAUNDERING OF COTTON AND LINEN FABRICS

26. *Test specimens.*—At least four test specimens, each 2 by 4 inches, are required for this test. To each of these four specimens is sewed or otherwise securely attached a piece of unsized, bleached, unmercerized cotton cloth, preferably 80/80, of equal size. If desired, a sample of composite test cloth [10] may be used in tests Nos. 1 and 2.

27. *Water.*—Ordinary tap water may be used if it does not contain over 35 parts per million of calcium carbonate or the equivalent; otherwise distilled water shall be used.

28. *Soap.*—The soap used shall be a good grade of soap, free of resin, and all substances other than true soap. A low titer soap is preferred. Soap solutions are made up on the basis of 88 percent of soap, 5 g per liter being the standard soap solution for all tests.

29. *Chlorine.*—Hypochlorite of soda solution as sold for laundry use containing 10 to 15 percent of available chlorine is available for the test requiring chlorine. Its strength must be determined by chemical analysis at frequent intervals, as its strength changes on standing.

30. *Washing machine.*—A Launder-Ometer or similar machine, in which 1-pint preserve jars are held with their bases toward a horizontal shaft 2 inches from the center of rotation and the shaft rotated at a speed of 40 to 45 revolutions per minute, shall be used. Provision shall be made for maintaining the initial temperature of the jars by rotating them in a water bath which can be heated.

31. *No. 1 test procedure.*

31a. The specimen to be tested is placed in a 1-pint glass jar containing 100 ml of a 0.5-percent soap solution heated to 105° F (40.5° C) and ten ⅜-inch rubber balls.

31b. The jar is then closed and placed in the washing machine (paragraph 30), which is half-filled with water at 105° F (40.5° C). The machine is operated for 30 minutes, maintaining the temperature at 105° ±2° F (40.5° +1.1° C). The jar is emptied and the specimen rinsed twice with 100 ml of water at 105° F (40.5° C) by shaking vigorously each time for 1 minute. The jar is then emptied and the specimen rinsed for 2 minutes with 100 ml of water at 80° F (26.7° C) containing 0.05 percent of acetic acid. The contents are then emptied and the specimen rinsed for 2 minutes with water at 80° F (26.7° C), hydroextracted or wrung, and dried by pressing the specimen in contact with the white cloth with a flatiron having a temperature between 275° and 300° F,[11] with the white cloth uppermost.

32. *No. 2 test procedure.*

32a. The specimen to be tested is placed in a 1-pint glass jar containing 100 ml of a 0.5-percent soap solution heated to 120° F (48.9° C) and ten ⅜-inch rubber balls.

32b. The jar is then closed and placed in the washing machine (paragraph 30), which is half-filled with water at 120° F (48.9° C).

[10] See footnote 1, p. 5.
[11] See footnote 5, p. 6.

The machine is operated for 30 minutes, maintaining the temperature of 120° ±2° F (48.9° ±1.1° C). The jar is emptied and the specimen rinsed twice with 100 ml of water at 105° F (40.5° C) by shaking vigorously each time for 1 minute. The jar is then emptied and the specimen rinsed for 2 minutes with 100 ml of water at 80° F (26.7° C) containing 0.05 percent of acetic acid. The contents are then emptied and the specimen rinsed for 2 minutes with water at 80° F (26.7° C), hydroextracted or wrung, and dried by pressing the specimen in contact with the white cloth with a flatiron having a temperature between 275° and 300° F,[12] with the white cloth uppermost.

33. *No. 3 test procedure.*

33a. The specimen to be tested is placed in a 1-pint glass jar [13] containing 100 ml of a 0.5-percent soap and 0.2-percent sodium carbonate (soda ash) solution heated to 160° F (71° C) and ten ⅜-inch rubber balls.

33b. The jar is then closed and placed in the washing machine (paragraph 30), which is half-filled with water at 160° F (71° C). The machine is operated for 45 minutes, maintaining the temperature at 160°±2° F (71°±1.1° C). The jar is emptied and the specimen rinsed twice with 100 ml of water at 105° F (40.5° C) by shaking vigorously each time for 1 minute. The jar is then emptied and the specimen rinsed for 2 minutes with 100 ml of water at 80° F (26.7° C) containing 0.05 percent of acetic acid. The contents are then emptied and the specimen rinsed for 2 minutes with water at 80° F (26.7° C), hydroextracted or wrung, and dried by pressing the specimen in contact with the white cloth with a flatiron having a temperature between 275° and 300° F,[14] with the white cloth uppermost.

34. *No. 4 test procedure.*

34a. The specimen to be tested is placed in a 1-pint glass jar [15] containing 100 ml of a 0.5-percent soap and 0.2-percent sodium carbonate solution heated to 180° F (82.2° C) and ten ⅜-inch rubber balls.[16] An addition of 1 ml of a 1-percent available chlorine solution of sodium hypochlorite is made just before entering the test sample into the glass jar.

34b. The jar is then closed and placed in the washing machine (paragraph 30), which is already half-filled with water at 180° to 185° F (82.2° to 85° C). The machine is operated for 45 minutes, maintaining the temperature as above. The jar is emptied and the specimen rinsed twice with 100 ml of water at 105° F (40.5° C) by shaking vigorously each time for 1 minute. The jar is then emptied and the specimen rinsed for 2 minutes with 100 ml of water at 80° F (26.7° C) containing 0.05 percent of acetic acid. The contents are then emptied and the specimen rinsed for 2 minutes with water at 80° F (26.7° C), hydroextracted or wrung, and dried by pressing the sample in contact with the white cloth with a flatiron having a temperature between 275° and 300° F,[17] with the white cloth uppermost.

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[12] See footnote 5, p. 6.

[13] For the No. 3 and 4 tests, it is advisable to preheat the glass jars and contents in a water bath before entering in the Launder-Ometer to avoid breakage and as an aid to more easily obtaining working temperatures.

[14] See footnote 5, p. 6.

[15] See footnote 13, p. 9.

[16] Fresh or new rubber balls may react with chlorine, thereby vitiating the results of the test. Such balls shall be washed in a separate solution as outlined in paragraph 34a before being used for testing purposes.

[17] See footnote 5, p. 6.

TABLE 1.—*Testing methods*

Test No.	Temperature	Soap	Sodium carbonate	Available chlorine	Time
	° *F.*	%	%	%	*min*
1	105	0.5	None	None	30
2	120	.5	None	None	30
3	160	.5	0.2	None	45
4	180–185	.5	.2	0.01	45

35. *Reporting colorfastness to laundering of cotton and linen fabrics.*

35a. *Class 1.*—Cotton and linen fabrics which have been subjected to No. 1 test and which show no appreciable change in color and no appreciable staining of the attached white sample shall be reported as having "Class 1 colorfastness to laundering." Such fabrics are considered launderable only in very careful home laundering at lukewarm temperatures when the temperature does not exceed wrist heat, when no alkali or chlorine is present, and when the material is not dried out of doors.

35b. *Class 2.*—Cotton and linen fabrics which have been subjected to No. 2 test and which show no appreciable change in color and no appreciable staining of the attached white sample shall be reported as having "Class 2 colorfastness to laundering." Such fabrics are considered launderable in home or commercial laundries under careful methods when the temperature does not exceed 120° F (48.9° C), when no aliali or chlorine is present, and when the material is not dried in direct sunlight.

35c. *Class 3.*—Cotton and linen fabrics which have been subjected to No. 3 test and which show no appreciable change in color and no appreciable sttaining of the attached white sample shall be reported as having "Class 3 colorfastness to laundering." Such fabrics may be expected to give satisfactory performance in normal commercial or home laundering when boiling temperatures are not employed, when chlorine is not used, and when the material is not dried in direct sunlight.

35d. *Class 4.*—Cotton and linen fabrics which have been subjected to No. 4 test and which show no appreciable change in color and no appreciable staining of the attached white sample shall be reported as having "Class 4 colorfastness to laundering." Such fabrics are considered of superlative fastness to home or commercial laundering, as the severity of this test permits acceptance of only the best and most expensive types of dyestuffs. It must be remembered, however, that there is no protection implied in this classification against the excessive use of chlorine in washing or the repeated effects of drying in direct sunlight.

IX. COLORFASTNESS TO LAUNDERING OF FABRICS OTHER THAN COTTON AND LINEN

36. *Test specimen.*—At least one test specimen, 2 by 4 inches, is required for this test. To it are sewed 1-inch square pieces of white wool, desized cotton, silk, viscose rayon, and acetate rayon fabrics, or a 2- by 4-inch piece of composite test cloth.[18]

[18] See footnote 1, p. 5.

37. *Washing machine.*—A Launder-Ometer, or similar machine, in which 1-pint preserve jars are held with their bases toward a horizontal shaft 2 inches from the center of rotation and the shaft rotated at a speed of 40 to 45 revolutions per minute, shall be used. Provision shall be made for maintaining the initial temperature of the jars by rotating them in a water bath which can be heated.

38. *Washing procedure.*—The specimen to be tested is placed in a 1-pint preserve jar to which is added 300 ml of a solution containing 0.5 percent of neutral soap in soft water heated to 100°±2° F (37.7°±1.1° C). The jar is then closed and placed in the machine, which is half-filled with water at 100°±2° F (37.7°±1.1° C). The machine is operated for 30 minutes. It shall be heated to maintain a constant temperature of 100°±2° F (37.7°±1.1° C). The specimen is then removed from the jar, rinsed in three changes of water at 100°±2° F (37.7°±1.1° C), rolled in a dry towel or absorbent cotton cloth to remove excess moisture, spread on a padded ironing board, and pressed until dry with a flatiron having a temperature between 275° and 300° F.[19] The specimen is allowed to lie on a smooth, horizontal surface for 1 hour at room temperature.

39. *Reporting colorfastness to laundering of fabrics other than cotton and linen.*

39a. *Class A.*—Fabrics other than cotton and linen which have been subjected to the above test and which show no appreciable change in color and no appreciable staining of the white cloths shall be reported as having "Class A colorfastness to laundering." The color of such fabrics is considered washable under careful methods.

X. COLORFASTNESS TO LIGHT

40. *Test specimens.*—At least one specimen approximately 2½ by 3 inches is required for this test.

41. *Apparatus.*—The apparatus for this test shall be a type F D A Fade-Ometer[20] or its equivalent. A suitable fading lamp consists of a carbon arc enclosed in Pyrex glass, which shall be well cleaned every 24 hours of use, operated on a direct current of approximately 13 amperes or 60-cycle alternating current of approximately 17 amperes, with 140 volts across the arc. The voltage of the power line to the apparatus is 208 to 250 volts. The distance from arc to samples is 10 inches. The air about the samples during exposure is humidified, but not to exceed 50-percent relative humidity, and its temperature is automatically controlled. The temperature of the air in the vicinity of the samples, measured with a mercury thermometer, shall not exceed 105° F (40.5° C) during this test. The apparatus shall be considered to be operating satisfactorily if standard sample *L3* (paragraph 83) fades appreciably when exposed continuously in the apparatus for 10 hours and standard sample *L5* (paragraph 83) does not fade appreciably when exposed for 40 hours. (To determine the degree of fading of either standard sample, place the exposed and a corresponding unexposed specimen in the same plane in such a position that somewhat diffused daylight, either standard artificial daylight or light from a northern sky, falls equally on both at an angle of about 45 degrees. Cover the specimens with a mask of medium-gray paper

[19] See footnote 5, p. 6.
[20] Manufactured by the Atlas Electric Devices Co., Chicago, Ill.

about 8 inches square having two centrally located 1-inch square holes separated by about 1 inch. Look squarely at the surfaces rather than from a position at an angle to the surfaces.)

42. *Procedure.*

42a. Each specimen shall be placed between opaque covers which will shield it from light except for an area of 1⅝ by 2 inches which shall be open to the air on both sides. The specimen so protected shall be exposed in the apparatus described above for a period of 10, 20, 40, 60, or 80 hours, depending upon its fastness. The longest period of exposure it will withstand without an "appreciable" change in color shall be determined. The results of preliminary observations made when the specimen is removed momentarily from the apparatus shall be confirmed after the specimen has been allowed to lie in the dark at room temperature for at least 2 hours.

42b. In examining the results of Fade-Ometer tests, the exposed portion shall be cut out inside of the line left by the edge of the aperture in the Fade-Ometer slide and the exposed portion shall then be mounted on a similar portion of unexposed cloth and the interpretation of "appreciable change" shall be determined on that comparison.

43. *Reporting colorfastness to light.*

43a. *Class 1.*—Fabrics which show no appreciable change in color after exposure to light in the apparatus (paragraph 41) for 10 hours shall be reported as having "Class 1 colorfastness to light." Such fabrics are considered satisfactory for use only when fastness to light is not important but when some little fastness is desirable.

43b. *Class 2.*—Fabrics which show no appreciable change in color after exposure to light in the apparatus (paragraph 41) for 20 hours shall be reported as having "Class 2 colorfastness to light." Such fabrics are considered satisfactory for use where moderate fastness to light is desirable but not of major importance.

43c. *Class 3.*—Fabrics which show no appreciable change in color after exposure to light in the apparatus (paragraph 41) for 40 hours shall be reported as having "Class 3 colorfastness to light." Such fabrics may be expected to give satisfactory performance where good fastness to light is essential.

43d. *Class 4.*—Fabrics which show no appreciable change in color after exposure to light in the apparatus (paragraph 41) for 60 hours shall be reported as having "Class 4 colorfastness to light." Such fabrics are considered of superior fastness to light and may be used where superior fastness to light is of major importance. Because of the severity of this test, the range of shades obtainable in this classification is limited.

43e. *Class 5.*—Fabrics which show no appreciable change in color after exposure to light in the apparatus (paragraph 41) for 80 hours shall be reported as having "Class 5 colorfastness to light." Such fabrics are considered of superlative fastness to light and may be used for any purpose where extreme fastness to light is required. The range of shades obtainable in this classification is definitely limited.

XI. COLORFASTNESS TO PERSPIRATION

44. *Test specimens.*—Two specimens of the fabric, each about 2 inches wide and of sufficient length that when rolled lengthwise and inserted in the glass tube, as described below, the roll will fit the bore of the tube, are required for this test.

45. *Reagents.*—Two solutions are required as follows:

Acid solution

10 g of sodium chloride.
1 g of lactic acid, USP 85 percent.
1 g of disodium orthophosphate anhydrous.
Make up to 1 liter with distilled water.

Alkaline solution

10 g of sodium chloride.
4 g of ammonium carbonate, USP.
1 g of disodium orthophosphate anhydrous.
Make up to 1 liter with distilled water.

46. *Procedure.*

46a. One of the test specimens and a similar size piece of composite test cloth [21] are thoroughly wet with the acid solution. The amount of solution left in the specimens should be in such a ratio that when the roll weighs dry 2½ g, the total weight will be 8 g. The two pieces are then rolled together, with the fabric to be tested on the inside. The other test specimen is prepared in a similar manner, except that the pieces are wet thoroughly with the alkaline solution.

46b. Each roll is then placed in a glass tube, one end of which is closed, leaving one-third of each roll projecting, the other two-thirds of the roll being protected from evaporation. The glass tube should be 15 to 20 mm (approximately $^{19}/_{32}$ to $^{25}/_{32}$ inch) in diameter; a length of 60 to 75 mm (approximately 2⅜ to $2^{15}/_{16}$ inches) is convenient.

46c. For cotton and linen fabrics, the tubes shall be placed in glass desiccators. The desiccators shall be approximately 4 inches in diameter and shall contain, in the bottom, 300 ml of a 70-percent sulfuric acid solution at 70° F (21.1° C) or a 55-percent sulfuric acid solution at 98° F (36.6° C). Larger desiccators with proportionate amounts of acid may be used. (For convenience, specimens may be dried in an oven, as outlined in paragraph 46d, but in cases of dispute or controversy, the final decision shall be based on tests carried out by the desiccator drying method.) Under room temperature, approximately 48 hours is required for drying. No specimen shall be rinsed after drying.

46d. For fabrics other than cotton and linen, each tube is placed in an oven maintained at a temperature of 100°±2° F (37.7°±1.1° C). The specimens are allowed to remain in the oven until dry, which drying should take place in about 48 hours. No specimen shall be rinsed after drying.

47. *Reporting colorfastness to perspiration.*

47a. *Class 0.*—Fabrics which have been subjected to the above test and which show appreciable change in color or appreciable staining of the test cloth, shall be reported as having "Class 0 colorfastness to normal perspiration." Such fabrics are not considered fast to perspiration.

47b. *Class A.*—Fabrics which have been subjected to the above test and which show no appreciable change in color and no appreciable staining of the test cloth, shall be reported as having "Class A colorfastness to normal perspiration." Such fabrics are considered fast to perspiration.

[21] See footnote 1, p. 5.

XII. COLORFASTNESS TO PRESSING, DRY AND WET, OF COTTON AND LINEN FABRICS

48. *Test specimens.*—At least two test specimens, each approximately 2 by 4 inches, are required for these tests. One of these specimens is covered with a piece of bleached unsized cloth which has been wet and thoroughly wrung out.

49. *Procedure.*

49a. *Dry pressing.*—The material to be tested is subjected dry to hot ironing for a period of 5 seconds at 425° F [22] and then allowed to lie in the dark at room temperature for 1 hour or until natural moisture is regained.

49b. *Wet pressing.*—The other test specimen is subjected to hot ironing for a perod of 10 seconds at 350° F [23] immediately after being covered with the wet cloth, and allowed to lie in the dark at room temperature for 1 hour or until natural moisture is regained.

50. *Reporting colorfastness to dry pressing of cotton and linen fabrics.*

50a. *Class 0.*—Cotton and linen fabrics which have been subjected to the dry-pressing test and which show appreciable change in color shall be reported as having "Class 0 colorfastness to dry pressing." Such fabrics are not considered fast to dry pressing.

50b. *Class A.*—Cotton and linen fabrics which have been subjected to the dry-pressing test and which show no appreciable change in color shall be reported as having "Class A colorfastness to dry pressing." Such fabrics are considered fast to dry pressing.

51. *Reporting colorfastness to wet pressing of cotton and linen fabrics.*

51a. *Class 0.*—Cotton and linen fabrics which have been subjected to the wet-pressing test and which show appreciable change in color or appreciable staining of the white fabric shall be reported as having "Class 0 colorfastness to wet pressing." Such fabrics are not considered fast to wet pressing.

51b. *Class A.*—Cotton and linen fabrics which have been subjected to the wet-pressing test and which show no appreciable change in color and no appreciable staining of the white fabric shall be reported as having "Class A colorfastness to wet pressing." Such fabrics are considered fast to wet pressing.

XIII. COLOR FASTNESS TO PRESSING, DRY AND WET, OF FABRICS OTHER THAN COTTON AND LINEN

52. *Test specimens.*—At least two test specimens, each approximately 2 by 4 inches, are required for these tests. To one of these specimens (woolen and worsted specimens excepted) are sewed pieces of white wool, desized cotton, silk, viscose rayon, and acetate rayon fabrics, or a piece of composite test cloth [24] of equivalent size.

53. *Procedure.*

53a. *Dry pressing.*—The test specimen without the sewed-on white fabrics is pressed for 10 seconds with a flatiron having a temperature between 275° and 300° F [25] at the point and allowed to rest for 2 hours. The specimen so pressed is compared with a piece of the fabric not pressed.

[22] Same as footnote 5, p. 6, except as to temperature, and proportion of alloy of tin, lead, and bismuth should suit individual case.
[23] See footnote 22, p. 14.
[24] See footnote 1, p. 5.
[25] See footnote 5, p. 6.

53b. *Wet pressing.*—The other test specimen is thoroughly wetted (in the case of woolens and worsteds, a piece of composite test cloth is thoroughly wetted, the surplus water shaken off, placed face down on the other dry test specimen) and pressed until dry on a pad permeable to steam with a flatiron having a temperature between 275° and 300° F [26] at the point, and allowed to rest for 2 hours. The specimen so pressed is compared with a piece of the fabric not pressed and the white fabrics are examined for staining.

54. *Reporting colorfastness to dry pressing of fabrics other than cotton and linen.*

54a. *Class 0.*—Fabrics other than cotton and linen which have been subjected to the dry-pressing test and which show appreciable change in color shall be reported as having "Class 0 colorfastness to dry pressing." Such fabrics are not considered fast to dry pressing.

54b. *Class A.*—Fabrics other than cotton and linen which have been subjected to the dry-pressing test and which show no appreciable change in color shall be reported as having "Class A colorfastness to dry pressing." Such fabrics are considered fast to dry pressing.

55. *Reporting colorfastness to wet pressing of fabrics other than cotton and linen.*

55a. *Class 0.*—Fabrics other than cotton and linen which have been subjected to the wet-pressing test and which show appreciable change in color or appreciable staining of the white fabrics shall be reported as having "Class 0 colorfastness to wet pressing." Such fabrics are not considered fast to wet pressing.

55b. *Class A.*—Fabrics other than cotton and linen which have been subjected to the wet-pressing test and which show no appreciable change in color and no appreciable staining of the white fabrics shall be reported as having "Class A colorfastness to wet pressing." Such fabrics are considered fast to wet pressing.

XIV. SHRINKAGE IN CLEANING, DRY AND WET

[For shrinkage in laundering, see sections XV and XVI]

56. *Test specimens.*—Two specimens are required, one for shrinkage in cleaning, dry, the other for cleaning, wet. The specimens shall be taken no nearer the selvage than one-tenth the width of the fabric. Each shall measure at least 12 by 12 inches. A 10-inch square whose sides are placed parallel with the warp and filling, respectively, of the specimen is outlined on it preferably with the aid of a rigid templet. The corners and midpoints of each side of the square are marked either with indelible ink applied with a fine pen, with a fine thread sewed into the fabric, or by 1/16-inch holes punched into the fabric.

57. *Apparatus.*—The apparatus used shall consist of a cylinder, preferably of metal approximately 13 inches high, having a diameter of about 8¾ inches (capacity 3 gallons). The cylinder shall be mounted in a vertical position on an axis, which is inclined 50° to the axis of the cylinder, and rotated about this axis at a speed of 45 to 50 revolutions per minute.

58. *Cleaning procedures.*

58a. *Cleaning, dry, procedure.*—The machine is filled approximately one-third full of a cleaning solution prepared by mixing together 1,000

[26] See footnote 5, p. 6.

parts by volume of Stoddard Solvent,[27] 67 parts of dry cleaning soap,[28] 4 parts of tertiary butyl alcohol. The two specimens and sufficient suitable worsted cloth [29] in pieces approximately 12 by 12 inches to make a total dry load of 1 pound are placed in the machine. It is operated for 25 minutes, the solution poured out, and the machine refilled approximately one-third full of fresh Stoddard Solvent without soap, alcohol, or water. The machine is then operated for an additional 10 minutes. The specimens are then removed, and without squeezing, laid out on a horizontal surface, such as a muslin-covered frame or screen. Wrinkles are removed by gently pressing the specimens with the palm of the hand. One specimen is pressed according to the method of paragraph 59a or 59b, or, if a pile fabric, steamed in accordance with paragraph 59c. The other specimen is treated further according to paragraph 58b.

58b. *Cleaning, wet, procedure.*[30]—The unpressed specimen from the preceding dry cleaning procedure is placed on a porcelain slab, or piece of slate, and wet with sufficient distilled water at a temperature of 90° to 100° F (32.2° to 37.7° C), containing 1 g of neutral soap per liter, to keep the fabric wetted thoroughly for 15 minutes. The fabric is then rinsed by immersing it in a liter of distilled water for 5 minutes, removed without squeezing, laid out on a horizontal surface, such as a muslin-covered frame or screen, and allowed to dry at room temperature. This specimen is pressed according to the method of paragraph 59a or 59b, or, if a pile fabric, steamed in accordance with paragraph 59c.

59. *Pressing.*—Either of the two methods outlined below may be used in the pressing of the specimen.

59a. *Hand pressing.*[31]—When most of the solvent has evaporated, the specimen is laid on a padded ironing board, care being taken to avoid any strain during handling. The specimen is covered with a damp muslin press cloth, weighing 4 to 4½ ounces per square yard, previously saturated with water and wrung out so as to retain moisture equal to approximately 75 percent of its dry weight. It is then pressed with a flatiron having a temperature between 275° and 300° F [32] at the point until dry. The specimen is allowed to lie on a smooth horizontal surface for 1 hour thereafter at room temperature.

59b. *Steam pressing (for all fabrics except pile fabrics).*[33]—When most of the solvent has evaporated, the specimen is laid on a bed of a flat-bed press, care being taken to avoid any strain during handling. The press shall be of a hot-bed or a polished metal top type for flat fabrics or a cloth-type press for rough crepes. The steam pressure shall be between 65 and 70 pounds. The head of the machine is lowered and held in contact with the fabric. During this period, the steam is admitted from the buck of the press for a period of from 5 to 10 seconds. The specimen is allowed to lie on a horizontal surface for 1 hour thereafter at room temperature.

59c. *Steaming (for pile fabrics).*—When most of the solvent has evaporated from a pile-fabric test specimen cleaned according to

[27] See footnote 2, p. 5.
[28] See footnote 3, p. 5.
[29] Worsted cloth of plain weave, 8 to 8.5 ounces per linear yard, 58 inches wide, is suitable for this purpose, and may be obtained from the Arlington Mills, Lawrence, Mass.
[30] See footnote 4, p. 5.
[31] It has been disclosed that as far as handling the fabric during pressing is concerned, this method is not generally accepted for woolens and worsteds. When an acceptable test procedure for holding woolen and worsted fabrics during pressing is developed, it will be offered for inclusion in this standard.
[32] See footnote 5, p. 6.
[33] See footnote 31, p. 16.

paragraph 58, the specimen is spread out on a steam board or table [34] on a damp muslin press cloth, weighing 4 to 4½ ounces per square yard, previously saturated with water and wrung out so as to retain moisture equal to approximately 75 percent of its weight. Steam is then turned on and allowed to pass through the pile fabric for 2 minutes. The test piece is then cooled to room temperature and allowed to lie in a smooth, horizontal position for 1 hour thereafter.

60. *Shrinkage.*—The distances marked in each direction on the specimens are then measured. The average changes in dimensions in the warp and in the filling directions for each specimen are calculated. These are designated the warp and filling shrinkages, respectively, of the specimens.

61. *Reporting shrinkage in cleaning, dry and wet.*

61a. The warp and filling shrinkages in "cleaning, dry" shall be reported separately, in percent, to the nearest whole number.

61b. The warp and filling shrinkages in "cleaning, wet" shall be reported separately, in percent, to the nearest whole number.

XV. SHRINKAGE IN LAUNDERING OF COTTON AND LINEN FABRICS

62. *Test specimen.*—One test specimen at least 20 inches square or at least 20 inches in length by the full width of the material is required for this test. There are marked off accurately on the specimen, in both the warp and filling directions, three 18-inch lengths, or longer when the size of the specimen permits, spaced at least 6 inches apart, at least 1 inch from all edges of the specimen, and not nearer the selvage than one-tenth the width of the fabric. Suitable marks are obtained with indelible ink applied with a fine pen or stamp, or fine threads sewed into the fabric. Care shall be taken to see that the distances are parallel with the yarns.

63. *Washing machine.*—The washing shall be carried out in a reversing wash wheel of the cylindrical type. A suitable type of machine for this test is one having a 20- or 24-inch wheel and taking a load of about 3 pounds of dry wash. Provision shall be made for adding water to the wheel at the designated temperature and for heating directly in the wheel, preferably by means of live steam.

64. *Washing procedure.*

64a. *Standard load.*—A load which is normal for the machine used is washed at one time. The load may be made up of test specimens and additional cloth as required. The amount of wash solution or rinse water shall be normal for the machine and in any event sufficient to cover the samples. Usually, an amount weighing about 50 times the weight of dry cloth will be sufficient.

64b. *Soap solution.*—Sufficient laundry soap, of good grade, to give good running suds shall be used. As a convenience, the soap may be dissolved in water prior to adding it to the wheel. A stock solution may be prepared by dissolving 1 pound of chip soap in 1 gallon of hot water. When cool, this forms a thick homogeneous jelly which may be added to the wheel as required.

64c. *Washing.*—The wash wheel is kept running continuously for 60 minutes from the start of this test. The wet cloth samples will thus be tumbled in the machine while the latter is being drained and

[34] See footnote 6, p. 6.

filled. This is essential. Each operation should be carried out without delay.

64d. The specimen to be tested and such additional cloth as is necessary to make up the load are placed in the wash wheel, which is then started running and the time noted. The required amount of water at a temperature not exceeding 100° F (37.7° C) and of soap are then added. The temperature is then raised to 212° F (100° C), preferably by injecting live steam into the wheel, and the heat then turned off. When the wheel has run for 40 minutes from the time it was started, the soap solution is drained off, the wheel filled to the proper level with water, and the temperature of the water raised to 140° F (60° C). At the end of 45 minutes from the start of the test, the water is again drawn off. The wheel is filled again to the proper level with water and its temperature raised to 140° F (60° C). At the end of 55 minutes from the start of the test, the water is drawn off and the wheel allowed to run without further additions to complete the full 60 minutes of operation, tumbling the wet samples in the wheel while the water drains. The specimens are removed from the wheel, and the excess water is squeezed from them by hand. Do not wring the specimens by hand or by means of squeeze rolls, as either method may distort the material and give unsatisfactory results The specimens are then placed horizontally on a screen or ventilated surface to dry. Do not hang the specimens vertically to dry. If a heated drying chamber is available, the specimens are dried therein, otherwise, in a current of air at room temperature from an electric fan. When the specimens are dry, they are laid out smoothly, without stretching, on a table, dampened, and allowed to lie for 5 minutes.

65. *Pressing.*—Either one of the two methods described below may be used in pressing the specimen. Whichever method of pressing is used, the specimen is allowed to cool before being measured again.

65a. *Hand pressing.*—The specimen is laid on a padded ironing table, all noticeable wrinkles carefully smoothed out, and pressed by raising and lowering the iron. Do not slide the iron back and forth on the specimen as this may distort the cloth. The iron temperature shall be between 275° and 300° F [35] at the point.

65b. *Machine pressing.*—The specimen is laid on the bed of the press, all noticeable wrinkles carefully smoothed out, and pressed by lowering the head of the machine. The specimen is removed from the bed of the machine in such a manner as to cause no strain on the cloth.

66. *Shrinkage.*—The distances marked in each direction on the specimens are then measured. The average changes in dimensions in the warp and in the filling directions for each specimen are calculated. These are designated the warp and filling shrinkages, respectively, of the specimens.

67. *Reporting shrinkage in laundering of cotton and linen fabrics.*—The warp and filling shrinkages shall be reported separately in percent, to the nearest whole number.

[35] See footnote 5, p. 6.

XVI. SHRINKAGE IN LAUNDERING OF FABRICS OTHER THAN COTTON AND LINEN

68. *Test specimen.*—One test specimen, not less than 12 by 12 inches, is required for this test. It shall be taken no nearer the selvage than one-tenth the width of the fabric. A 10-inch square whose sides are placed parallel with the warp and filling, respectively, of the specimen is outlined on it preferably with the help of a rigid templet. The corners and midpoints of each side of the square are marked either with indelible ink applied with a fine pen or with a fine thread sewed into the fabric.

69. *Washing machine.*—The apparatus used shall consist of a cylinder, preferably of metal, approximately 13 inches high, having a diameter of about 8¾ inches (capacity 3 gallons). The cylinder shall be mounted in a vertical position on an axis, which is inclined 50° to the axis of the cylinder and rotated about this axis at a speed of 45 to 50 revolutions per minute.

70. *Washing procedure.*—The machine is filled approximately one-third full of a solution containing 0.5 percent of neutral soap in soft water heated to 100°±2° F (37.7°±1.1° C). A specimen, prepared as in paragraph 68, and sufficient suitable worsted cloth [36] in pieces approximately 12 by 12 inches to make a total dry load of 1 pound are placed in the machine. The machine is operated for 30 minutes. The specimen is then removed and rinsed in three changes of water at 100°±2° F (37.7°±1.1° C).

71. *Pressing corresponding to household practice.*—The specimen is rolled in a dry towel or absorbent cotton cloth to remove excess moisture, spread on a padded ironing board, and pressed until dry with a flatiron having a temperature between 275° and 300° F [37] at the point. During pressing, the operator shall exert the tension usual in hand ironing, tending to reshape and restore the specimen to its original size and shape, as is done in home pressing. The specimen is allowed to lie on a smooth, horizontal surface for 1 hour thereafter at room temperature.

72. *Shrinkage.*—The distances marked in each direction on the specimens are then measured. The average changes in dimensions in the warp and in the filling directions for each specimen are calculated. These are designated the warp and filling shrinkages, respectively, of the specimens.

73. *Reporting shrinkage in laundering of fabrics other than cotton and linen.*—The warp and filling shrinkages shall be reported, in percent, to the nearest whole number.

XVII. RESISTANCE TO YARN SLIPPAGE

74. *Test specimens.*—Three test specimens, each 4 inches wide by at least 14 inches long, shall be cut from a sample in its original condition and also from a sample which has been laundered (see paragraph 70), or cleaned, dry or wet (see paragraph 58), or both depending upon the intended use of the materials, with the long dimension in the direction of the yarns upon which the slippage is to be determined.

[36] See footnote 29, p. 16.
[37] See footnote 5, p. 6.

If less force is required to slip the filling yarns on the warp yarns, the 14-inch dimension shall be across the filling. However, if less force is required to slip the warp yarns on the filling yarns, then the 14-inch dimension shall be across the warp. Generally the direction of pull for least resistance to yarn slippage is determinable by the thumb and finger method. However, where that method does not suffice, the direction of pull shall be determined from the results of tests of two preliminary specimens (one cut in each direction).

75. *Preparation of specimens.*

75a. Each specimen is folded back upon itself so that the distance from the fold to one end measures at least 4 inches and to the other end, at least 10 inches, care being taken to have the fold parallel to the crosswise yarns. About one-half inch from the fold, a seam is sewed parallel with the crosswise yarns. The fold is cut either before or after making the seam.

75b. (A satisfactory procedure to obtain a correct seam when the fabric is such that a yarn can be drawn, is to draw out a crosswise yarn 4 inches from one end to mark the fold and then cut the specimen along the drawn yarn. The cloth guide attachment on the sewing machine is set for one-half inch and the fold or cut edges alined with it for sewing the seam.)

75c. The seam is sewed with a plain stitch (Stitch type 301, Federal Specification DDD–S–751) with 00 white, mercerized, cotton thread, 14 stitches to the inch, under uniform tension and as near perpendicular to the filling or warp yarns as possible. The approximate needle diameter shall be 0.030 inch.

76. *Testing machine.*

76a. A motor-driven pendulum machine shall be used.

76b. The faces of the front members of the jaws shall measure 1 by 1 inch, and the faces of the back members shall be 1 inch in the direction of the application of the load and 2 inches or more perpendicular to the direction of the application of the load. If the resistance to yarn slippage is less than 10 pounds, the faces of the front members of the jaws shall be 1 by 2 inches. The jaws shall have smooth, flat faces with edges very slightly rounded to prevent cutting, and they should be pivoted to take the direction of loading force easily and smoothly.

76c. The maximum capacity of the machine shall not exceed 55 pounds (25 kg). The jaws through which the load is applied shall move at a uniform speed of $12 \pm \frac{1}{2}$ inches per minute.

76d. The machine shall be provided with an autographic recording device to trace a load-elongation curve.

76e. In order to obtain proper alinement, it has been found helpful, after gripping the specimen in the upper jaw, to attach to the lower end of the specimen an auxiliary 6-ounce clamp having jaws at least 4 inches wide.

77. *Conditioning.*—The test specimen is placed in an atmosphere having a relative humidity of 65 percent at 70° F (21° C) for at least 4 hours. A tolerance of ± 2 percent is permitted in relative humidity and ± 2° F (1.1° C) in temperature. In cases of dispute, tests shall be conducted on test specimens which are in equilibrium with the foregoing standard atmosphere. Material is considered to be in equilibrium when it shows no progressive change in weight.

78. *Fabric elongation.*

78a. With the distance between the two pairs of jaws of the testing machine adjusted to 3 inches, the prepared test specimen, with the

long portion uppermost, is placed symmetrically in the upper jaws so that the long dimension of the 10-inch part of the specimen is parallel to the direction of application of the load, and clamped so that the seam is at least 3 inches below the lower edge of the lower jaw. The 6-ounce clamp, when used, is attached to the specimen at a point beneath the lower jaw so that a uniform tension of that amount will be applied when the lower jaw is clamped tight.

78b. The load-elongation curve is obtained up to the breaking load, or up to 55 pounds if the specimen breaks at a higher load. This is the load-elongation curve for the fabric.

79. *Seam elongation.*—The test specimen is inserted symmetrically in the machine so that the seam is in a position parallel to the jaws and midway between the upper and lower jaws in a manner similar to the procedure under paragraph 78a. The seam-elongation curve is recorded on the same record sheet used for recording the load-elongation curve.

80. *Resistance to yarn slippage.*—

80a. The load per inch of width at which the elongations of the fabric and the seam differ by one-fourth inch more than the difference in the elongations at a load of 1 pound is designated the resistance to yarn slippage.

80b. The resistance to yarn slippage of the cloth in either direction is the average of tests on three specimens. (When using the 2-inch front jaws, the results obtained are divided by 2 to obtain the resistance to yarn slippage.) If a specimen slips in the jaws, breaks in the jaws, breaks at the edges of the jaws, or for any reason attributable to faulty operation a result differs markedly from the average for the set, that result is disregarded, another specimen taken, and the result of this test included in the average. If the fabric or the seam breaks before ¼-inch slippage occurs, the reported slippage is that at the breaking load.

80c. The resistance to yarn slippage may be obtained from the load-elongation curves by placing the points of a pair of dividers on the two curves at the points corresponding to a load of 1 pound. Increase the distance between the ends of the dividers by an amount corresponding to ¼-inch elongation and find the load at which the curves are separated by this distance.

81. *Reporting resistance to yarn slippage.*—The resistance to yarn slippage shall be reported in pounds to the nearest whole number, and the report shall state whether the results are based on fabrics in their original condition; after being cleaned, dry or wet; or after being laundered.

XVIII. STANDARD DYEINGS (STANDARD SAMPLES)

82. *Standard samples.*—The standard samples prescribed for judging the satisfactory operation of Fade-Ometers were chosen from among the standard dyeings of the American Association of Textile Chemists and Colorists. They can be obtained from Louis A. Olney, chairman, Research Committee, AATCC, Lowell Textile Institute, Lowell, Mass., at a nominal cost.

83. *Colorfastness to light.*

Standard sample L3.—1.2 percent Brilliant Indocyanine 6B; dyed on wool. (See 1940 Year Book, AATCC, page 197).

Standard sample L5.—1.0 percent Anthraquinone Blue RXO (Cyananthrol RX); dyed on wool. (See 1940 Year Book, AATCC, page 197).

XIX. WARRANTY

84. The following illustrates the manner in which a laboratory may certify complete compliance with the commercial standard. Laboratories complying with the methods of testing and reporting as recorded in the standard may be readily identified by the following statement on their reports:

> The ---------- warrants that the results given in this report were obtained in accordance with Woven Textile Fabrics—Testing and Reporting, Commercial Standard CS59–41, as issued by the National Bureau of Standards of the United States Department of Commerce.
>
> or
>
> This test report is based on Woven Textile Fabrics—Testing and Reporting, Commercial Standard CS59–41, as issued by the National Bureau of Standards of the United States Department of Commerce.

XX. NOTES

85. *Breaking strength, standard conditions.*—The test method outlined herein for breaking strength under standard atmospheric conditions is in agreement with all essential requirements of Standard General Methods of Testing Woven Textile Fabrics as issued by the American Society for Testing Materials (ASTM Designation D39–39), and approved as American Standard L5–1939 by the American Standards Association; and Textiles, General Specifications, Test Methods, Federal Specification CCC–T–191a, April 23, 1937.

86. *Breaking strength, wet.*—The test method outlined herein for the breaking strength of a fabric in the wet state is in agreement with all essential requirements of Standard Method of Test for Strength of Rayon Woven Fabric When Wet, as issued by the American Society for Testing Materials (ASTM Designation D415–38).

87. *Colorfastness to chlorine.*—The test method outlined herein for colorfastness to chlorine complies in all essential requirements with Color Fastness Specifications for Dyed or Printed Cotton or Linen Piece or Woven Materials, approved by the National Association of Finishers of Textile Fabrics, October 10, 1939.

88. *Colorfastness to crocking (rubbing).*—The method outlined herein for colorfastness to crocking (rubbing) complies in all essential requirements with Fastness to Rubbing (Crocking) as given in the 1940 Year Book of the American Association of Textile Chemists and Colorists; Color Fastness Specifications for Dyed or Printed Cotton or Linen Piece or Woven Materials, approved by the National Association of Finishers of Textile Fabrics, October 10, 1939; and Textiles, General Specifications, Test Methods, Federal Specification CCC–T–191a, April 23, 1937.

89. *Colorfastness to laundering of cotton and linen fabrics.*—The method for determining colorfastness to laundering of cotton and linen fabrics outlined herein complies in all essential requirements with Fastness to Laundering and Domestic Washing of Dyed or Printed Cotton as given in the 1940 Year Book of the American Association of Textile Chemists and Colorists; and Color Fastness Specifications for Dyed or Printed Cotton or Linen Piece or Woven Materials, approved by the National Association of Finishers of Textile Fabrics, October 10, 1939.

90. *Colorfastness to light.*—The method outlined herein for colorfastness to light complies in all essential requirements with Fastness to Light of Dyed Textiles, as given in the 1940 Year Book of the American Association of Textile Chemists and Colorists; Standard Method of Test for Fastness of Colored Textile Fabrics to Light as issued by the American Society for Testing Materials (ASTM Designation D506–39); Color Fastness Specifications for Dyed or Printed Cotton or Linen Piece or Woven Materials, approved by the National Association of Finishers of Textile Fabrics, October 10, 1939; and Textiles, General Specifications, Test Methods, Federal Specification CCC–T–191a, April 23, 1937.

91. *Colorfastness to perspiration.*—The method outlined herein for colorfastness to perspiration complies in all essential requirements with Fastness to Perspiration of Dyed Textiles as given in the 1940 Year Book of the American Association of Textile Chemists and Colorists; Color Fastness Specifications for Dyed or Printed Cotton or Linen Piece or Woven Materials, approved by the National Association of Finishers of Textile Fabrics, October 10, 1939; and Textiles, General Specifications, Test Methods, Federal Specification CCC–T–191a, April 23, 1937.

92. *Colorfastness to pressing, dry and wet, of cotton and linen fabrics.*—The methods outlined herein for colorfastness to pressing, dry, and pressing, wet, comply in all essential requirements with Color Fastness Specifications for Dyed or Printed Cotton or Linen Piece or Woven Materials, approved by the National Association of Finishers of Textile Fabrics, October 10, 1939.

93. *Shrinkage in laundering of cotton and linen fabrics.*—The method outlined herein for the shrinkage in laundering of cotton and linen fabrics complies in all essential requirements with the method for Determining Shrinkage in Washable Woven Cotton Fabrics as given in the 1940 Year Book of the American Association of Textile Chemists and Colorists; Standard Method of Test for Shrinkage in Laundering of Woven Cotton Cloth as issued by the American Society for Testing Materials (ASTM Designation D437–36) and approved as American Standard L10–1936 by the American Standards Association; and Textiles, General Specifications, Test Methods, Federal Specification CCC–T–191a, April 23, 1937.

94. *Resistance to yarn slippage.*—The method outlined herein for resistance to yarn slippage complies in all essential requirements with Tentative Method of Test for Resistance to Yarn Slippage in Silk, Rayon, and Silk-Rayon Woven Fabrics (ASTM Designation 434–36T) as issued by the American Society for Testing Materials.

EFFECTIVE DATE

The standard is effective as a basis for testing and reporting from March 28, 1941.

STANDING COMMITTEE

The following comprises the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Each organization nominated its own representatives. Comment concerning the standard and suggestions for revision may be addressed to any member

of the committee or to the Division of Trade Standards, National Bureau of Standards, which acts as Secretary for the committee.

T. L. BLANKE (chairman), National Retail Dry Goods Association, 101 West 31st Street, New York, N. Y.
C. W. DORN, J. C. Penney Co., 330 West 34th Street, New York, N. Y. Representing National Retail Dry Goods Association.
GERALD C. MACDONALD, Montgomery Ward & Co., Chicago, Ill.
LAURA E. PRATT, Sears, Roebuck & Co., Chicago, Ill.
A. H. SKINNER, Carson Pirie Scott & Co., 366 West Adams Street, Chicago, Ill. Representing Wholesale Dry Goods Institute.
D. E. DOUTY, U. S. Testing Co., 1415 Park Avenue, Hoboken, N. J.
H. H. HATCH, Hatch Textile Research, 25 E. 26th Street, New York, N. Y.
FRANK STUTZ, Better Fabrics Testing Bureau, 101 West 31st Street, New York, N. Y.
CHARLES L. SIMON, Industrial By-Products and Research Corp., Gimbel Building, 8th and Market Street, Philadelphia, Pa.
HARRY LEVINE, Textile Testing and Research Laboratories, 24 West 26th Street, New York, N. Y. Representing American Association of Textile Technologists.
CHARLES K. EVERETT, The Cotton Textile Institute, 320 Broadway, New York, N. Y.
H. G. ZERVAS, Lewiston Bleachery and Dye Works, 40 Worth Street, New York, N. Y. Representing National Association of Finishers of Textile Fabrics.
HUGH CHRISTISON, Arlington Mills, 500 Broadway, Lawrence, Mass. Representing National Association of Wool Manufacturers.
MORTIMER LANZIT, National Dress Manufacturers Association, 1450 Broadway, New York, N. Y.
FRED MUELLER, Stunzi Sons Silk Co., 1400 Broadway, New York, N. Y. Representing National Federation of Textiles, Inc.
RUTH O'BRIEN, Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C. Representing American Home Economics Association.
JOSEPHINE L. PEIRCE, General Federation of Women's Clubs, 1006 Cook Tower, Lima, Ohio.
CHARLOTTE PAYNE, National Council of Women of the United States, Inc., 501 Madison Avenue, New York, N. Y.
PAULINE BERRY MACK, The Ellen H. Richards Institute, Pennsylvania State College, State College, Pa.
ETHEL L. PHELPS, University of Minnesota, University Farm, St. Paul, Minn.
SAMUEL J. WALKER, National Association Institute of Dyeing and Cleaning, Inc., 7901 Georgia Avenue, Silver Spring, Md.
EPHRAIM FREEDMAN, R. H. Macy & Co., 34th and Broadway, New York, N. Y. Representing Committee D–13, American Society for Testing Materials.
BERTIL A. RYBERG, Lowell Textile Institute, Lowell, Mass. Representing the American Association of Textile Chemists and Colorists.

HISTORY OF PROJECT

During 1934 the difficulties in adjusting differences of opinion between dress-fabric manufacturers, converters, finishers, dress manufacturers, and distributors as to the causes of consumer complaints, led the National Retail Dry Goods Association, under date of February 28, 1935, to request the cooperation of the National Bureau of Standards in establishing a commercial standard on methods of testing and reporting woven dress fabrics.

With the cooperation of the Fabric Serviceability Committee of the Dress Code Authority, a committee representing three textile testing laboratories—namely, the Better Fabrics Testing Bureau, Inc., Hatch & Reutlinger (Hatch Textile Research), and the United States Testing Co., Inc.—prepared a preliminary draft as a basis for discussion under the chairmanship of W. D. Appel, of the National Bureau of Standards.

The proposed standard, as drafted by the above committee, was considered at two public conferences, one in Washington on June 22, 1935, and the other in New York on September 27, 1935. With changes and additions to suit the composite recommendations of manufacturers, testing laboratories, distributors, and consumers of woven dress fabrics, the proposed standard was adopted at the latter conference. The draft as adopted was submitted on October 31, 1935, to those concerned for written acceptance, and announcement of the success of the project was issued on April 15, 1936. The standard became effective on that day and was designated as CS59–36.

FIRST REVISION

A revision of the standard to include methods of testing and reporting colorfastness to perspiration, colorfastness to wet pressing, and several changes in methods of test in order to keep the standard abreast of progress, was approved by the standing committee and circulated to all interested on November 30, 1938. Some supplemental changes in the recommended revision, largely minor in character, were subsequently offered by industry, approved by the standing committee, and distributed on March 22 to March 24 for approval. Following written acceptance by a preponderant majority of the independent textile testing volume, the revision known as CS59–39 became effective from June 24, 1939.

SECOND REVISION

On January 8, 1940, the National Association of Finishers of Textile Fabrics and the American Association of Textile Chemists and Colorists jointly requested the revision of CS59–39 in accordance with Colorfastness Specifications for Dyed or Printed Cotton or Linen Piece or Woven Materials as approved by the NAFTF on October 10, 1939, and endorsed by important organizations. The changes in CS59–39 include judging the various degrees of colorfastness on an "appreciable change" basis, the addition of methods of test for colorfastness to chlorine and an additional test for colorfastness to laundering of cotton and linen fabrics, new methods of test for colorfastness to pressing of cotton and linen fabrics, and several changes in methods of test in order to keep the standard abreast of progress. These changes, approved by the standing committee with the recommendation that the title of the Standard be changed to Woven Textile Fabrics—Testing and Reporting, were circulated to the trade for acceptance on October 31, 1940.

Following written acceptance by a satisfactory majority of independent textile testing volume, announcement of the success of the project was issued on February 28, 1941.

ACCEPTANCE OF COMMERCIAL STANDARD

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this commercial standard.

Date_____

Division of Trade Standards,
National Bureau of Standards,
Washington, D. C.

Gentlemen:

Having considered the statements on the reverse side of this sheet, we accept the Commercial Standard CS59–41 as our standard of practice for the testing and reporting of *Woven Textile Fabrics*, with which we are directly concerned as a

Fabric manufacturer [1] Fabric commodity manufacturer [1] Testing laboratory [1] Distributor [1] Consumer [1]

We will assist in securing its general recognition and use, and will cooperate with the standing committee to effect revisions of the standard when necessary.

Signature of individual officer _____
(in ink)

(Kindly typewrite or print the following lines)

Name and title of above officer _____

Organization_____
(Fill in exactly as it should be listed)

Street address_____

City and State_____

[1] Please designate which group you represent by drawing lines through the other four. Please file separate acceptances for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade papers, colleges, etc., desiring to record their general approval, the words "in principle" should be added after the signature.

(Cut on this line)

TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups, as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices and the like.

2. *The acceptor's responsibility.*—The purpose of commercial standards is to establish for specific commodities, nationally recognized grades or consumer criteria and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the commercial standard where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of commercial standards on a Nation-wide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

The organizations and individuals listed below have accepted this specification as their standard of practice in the testing and reporting of woven textile fabrics. Such endorsement does not signify that they may not find it necessary to deviate from the standard, nor does it signify that the testing laboratories so listed guarantee all of their test reports to conform with the requirements of this standard. Therefore specific evidence of conformity should be obtained where required.

ASSOCIATIONS

American Association of Textile Chemists & Colorists, Lowell, Mass. (In principle.)
American Home Economics Association, Washington, D. C. (In principle.)
American Homemakers Association, Oak Park, Ill.
Association of Cotton Textile Merchants of New York, New York, N. Y. (In principle.)
Chicago Laundry Owners' Association, Chicago, Ill. (In principle.)
Cotton Textile Institute, Inc., The, New York, N. Y. (In principle.)
Greater New York Retail Furnishings & Dry Goods Association, Inc., New York, N. Y.
International Silk Guild, New York, N. Y. (In principle.)
Linen Trade Association, Inc., New York, N. Y. (In principle.)
National Association of Cotton Manufacturers, Boston, Mass.
National Association of Dyers & Cleaners, Silver Spring, Md.
National Association of Finishers of Textile Fabrics, New York, N. Y.
National Association of House Dress Manufacturers, Inc., New York, N. Y.
National Association Institute of Dyeing & Cleaning, Inc., Silver Spring, Md.
National Association of Institutional Laundry Managers, Upper Darby, Pa.
National Council of Women of the U. S., Inc., New York, N. Y.
National Pajama Guild, Inc., New York, N. Y.
National Research Council of Canada, Ottawa, Canada. (In principle.)
National Retail Dry Goods Association, New York, N. Y. (In principle.)
New York Clothing Manufacturers Exchange, Inc., New York, N. Y. (In principle.)
Ohio State Association of Dyers & Cleaners, Columbus, Ohio. (In principle.)
Pacific Coast Garment Manufacturers, San Francisco, Calif.
Pennsylvania Association of Dyers & Cleaners, Sharon, Pa. (In principle.)
Pennsylvania Laundryowners Association, Philadelphia, Pa.

FIRMS

Abbott Co., Amos, Dexter, Maine.
Abraham & Straus, Inc., Brooklyn, N. Y.
Acme Laundry & Cleaners, El Paso, Tex.
Alaska, University of, College, Alaska. (In principle.)
Alexandria Steam Laundry, Inc., Alexandria, La.
Allied Textile Printers, Inc., Paterson, N. J.
American Aniline Products, Inc., New York, N. Y.
American Cleaners, Moorhead, Minn.
American Dry Cleaning Co., Charlotte, N. C.
American Laundry & Drycleaners, Ketchikan, Alaska.
American Viscose Corporation, Marcus Hook, Pa.
Anderson Newcomb Co., The, Huntington, W. Va.
Apponaug Co., The, Apponaug, R. I.
Arbeka Webbing Co., Pawtucket, R. I.
Arcade Sunshine Co., Inc., Washington, D. C. (In principle.)
Aridye Corporation, Fair Lawn, N. J.
Arizona, University of, Tucson, Ariz. (In principle.)
Arkwright, Inc., New York, N. Y.
Arlington Mills, Boston, Mass.
Armco Finishing Corporation, Greensboro, N. C.
Arnold Print Works, North Adams, Mass.
Arsem, William C., Schenectady, N. Y..

Atlas Powder Co., Zapon Division, Stamford, Conn.
Baker Cleaning Co., Tarrant, Ala.
Balfour Mills, Inc., Balfour, N. C.
Balloon Dye Works, San Diego, Calif.
Bamberger & Co., L., Newark, N. J.
Bancroft & Sons Co., Joseph, Wilmington, Del.
Barber, Ernest, Paterson, N. J.
Barnett Woolen Mills, Milwaukee, Wis.
Baxter Laundries Corporation, Grand Rapids, Mich.
Bellman Brook Bleachery Co., Fairview, N. J.
Belmar Dye Works, Inc., Long Island City, N. Y.
Bergner & Co., P. A., Peoria, Ill.
Bernat & Sons Co., Emile, Jamaica Plain, Mass.
Best & Co., Edward H., Boston, Mass.
Better Fabrics Testing Bureau, New York, N. Y.
Betty Brooks Co., Inc., Huntington Park, Calif.
Bishop Laundry Co., Rocky Mount, N. C.
Blum Store, The, Philadelphia, Pa.
Bob's Laundry & Dry Cleaning Co. Concord, N. C.
Bon Marche', The, Seattle, Wash.
Borger Laundry, Borger, Tex.
Bosbachs's, Inc., Holyoke, Mass.
Boston Store, Milwaukee, Wis.
Botany Worsted Mills, Passaic, N. J.
Bradley & Co., W. W., Delavan Wis.
Broadway Department Store, Inc., Los Angeles, Calif.
Brown Co., John A., Oklahoma City, Okla.
Brown's Sons, Inc., George, Mount Joy, Pa.
Buffalo Testing Laboratories, Inc., Buffalo, N. Y.
Burger-Phillips Co., Birmingham, Ala.
Burkhart's Laundry & Dye Works, Houston, Tex. (In principle.)
Burlington Corporation, The, New York, N. Y.
Burns Co., W. H., Frankford, Philadelphia, Pa.
Burrows & Sanborn, Inc., Lynn, Mass.
Buser Silk Corporation, R. G., Paterson, N. J.
Bush-Bull Corporation, Bethlehem, Pa.
Cain Cleaners, Mount Hope, Kans.
Caledonian Dye Works, Inc., Philadelphia, Pa.
California, University of, Berkeley, Calif.
Callaway Mills, LaGrange, Ga.
Cantor Greenspan Co., Inc., New York, N. Y.
Capital Laundry Co., Bismarck, N. Dak.
Capitol-Barg Dry Cleaning Co., Cincinnati, Ohio.
Carson Pirie Scott & Co., Chicago, Ill.
Casper-Troy Laundry Co., Casper, Wyo.
Catoir Silk Co., West New York, N. J.
Cavanagh Research (Division of Hat Corporation of America), East Norwalk, Conn. (In principle.)
Central Commercial High School, Testing Laboratory, New York, N. Y. (In principle.)
Cery Cleaners, Gary, Ind.
Chappell & Sons, Inc., C. E., Syracuse, N. Y.
Chehalis City Laundry, Chehalis, Wash.
Chemical Manufacturing Co., Inc., Ashland, Mass.
Cheney Brothers, Manchester, Conn.
Cherokee Spinning Co., Knoxville, Tenn.
Ciba Co., Inc., New York, N. Y.
City Cleaning & Dyeing Co., Sheridan, Wyo.
City Laundering Co., Oelwein, Iowa.
Cleland Simpson Co., Scranton, Pa.
Cleveland Cloth Mills, Shelby, N. C.
Clifton Manufacturing Co., Clifton, S. C.
Cohen & Sons, Inc., Joseph H., New York, N. Y.
College Cleaners & Dyers, Corvallis, Oreg. (In principle.)
Connecticut, University of, Storrs, Conn. (In principle.)
Consolidated Textile Co., Inc., Windsor Print Division, North Adams, Mass.
Consumers' Testing Laboratories, Philadelphia, Pa.
Consumers Union of the United States, New York, N. Y.
Cox & Fuller, New York, N. Y.
Craighead Laundry, Hot Springs, Ark.
Cranston Print Works Co., Cranston, R. I.
Crawford Laundry Co., The, Bridgeport, Conn.
Crisp Laundry & Dry Cleaning Co., Sault Ste. Marie, Mich.
Crown Laundry & Dry Cleaning Co., Indianapolis, Ind. (In principle.)
Dallas, Better Business Bureau of, Dallas, Tex.
Deisroth's Sons, P., Hazleton, Pa.
Delta Finishing Co., Philadelphia, Pa.
Dengler Cleaning Works, G., Susanville, Calif.
Derby Co., The, Lawrence, Mass.
Detroit, Board of Education of, Detroit, Mich.
Detroit Testing Laboratory, The, Detroit, Mich. (In principle.)
Detroit, University of, Detroit, Mich.
Deuser's, Inc., Dayton, Ohio.
Dewey Co., A. G., Quechee, Vt.
Dominion Silk Dyeing & Finishing Co., Ltd., Drummondville, Quebec, Canada.
Drexel Institute of Technology, Philadelphia, Pa.
Edgewater Dyeing & Finishing Co., Frankford, Philadelphia, Pa. (In principle.)
Eggert, E.,—Cleaning & Dyeing, Harrisburg, Pa.

Ekroth Laboratories, Inc., Brooklyn, N. Y.
El Paso Testing Laboratories, El Paso, Tex.
Electrical Testing Laboratories, New York, N. Y.
Emery-Bird-Thayer Co., Kansas City, Mo.
Empire Cleaners & Dyers, Omaha, Nebr.
Empire Worsted Mills, Inc., Jamestown, N. Y.
Erwin Cotton Mills Co., The, Durham, N. C.
Esselen, Inc., Gustavus J., Boston, Mass.
Fair, The, Chicago, Ill.
Fandel Co., St. Cloud, Minn.
Federated Textiles, Inc., New York, N. Y.
Fishburn-Oriental Dyeing & Dry Cleaning Co., Dallas, Tex. (In principle.)
Fletcher Co., Inc., W. F., Ithaca, N. Y.
Fligelman's, Helena, Mont.
Fond du Lac Model Laundry Co., Fond du Lac, Wis. (In principle.)
Fox & Co., Inc., G., Hartford, Conn.
Frank Associates, Inc., New York, N. Y.
Franklin Cotton Mill Co., The, Cincinnati, Ohio.
Frazier-Hall Laundry-Cleaners, Inc., Jackson, Tenn.
Freedlander Co., H., Wooster, Ohio.
French Textile School, A., Atlanta, Ga.
Fries & Schuele Co., The, Cleveland, Ohio.
Froehling & Robertson, Inc., Richmond, Va.
Fruit of the Loom, Inc., Providence, R. I.
Fuller Cleaning & Dyeing Co., Inc., Cleveland, Ohio.
Gable Co., The William F., Altoona, Pa.
Galli & Son, J., Paterson, N. J.
Galveston Laboratories, Galveston, Tex. (In principle.)
Gardner Dry Cleaning Works, Gardner, Mass.
Geigy Co., Inc., New York, N. Y. (In principle.)
General Dyestuff Corporation, New York, N. Y.
General Testing Laboratories, Inc., Detroit, Mich.
Geneva Fabrics, Inc., Paterson, N. J.
Georgia Institute of Laundering & Dry Cleaning, Atlanta, Ga.
Giddings, Inc., Colorado Springs, Colo.
Gilchrist Co., Boston, Mass.
Glasco Finishing Co., The, Glasco, Conn.
Glenlyon Print Works, Phillipsdale, R. I.
Globe Dye Works Co., Philadelphia, Pa.
Goldman Bros., Ann Arbor, Mich. (In principle.)
Good Housekeeping Institute, New York, N. Y.
Grossett Mills, Anderson, S. C.
Great Lakes Thread Co., Detroit, Mich. (In principle.)
Hafner Associates, Inc., Long Island City, N. Y.
Hager & Bro., Inc., Lancaster, Pa.
Hahne & Co., Newark, N. J.
Hardy & Co., Wm. D., Muskegon, Mich.
Harris Stores Co., Pittsburgh, Pa.
Hart & Co., L., San Jose, Calif.
Hatch Textile Research, Inc., New York, N. Y.
Hawkeye Laundry Co., Boone, Iowa.
Heck Silk Co., Inc., E. Stroudsburg, Pa.
Hellwig Silk Dyeing Co., The, Philadelphia, Pa.
Herpolsheimer Co., Grand Rapids, Mich.
Herron Co., The James H., Cleveland, Ohio.
Herzbergs, Inc., Omaha, Nebr.
Hess, Goldsmith & Co., Inc., New York, N. Y.
Hibbing Laundry & Cleaning Co., Hibbing, Minn.
Hochstadter Laboratories, Inc., New York, N. Y.
Home Laundry, The, Port Arthur, Tex.
Horrocks & Bro., Philadelphia, Pa.
Hospital Bureau of Standards & Supplies, Inc., New York, N. Y.
Houghton & Simonds, Brattleboro, Vt.
Houston, Better Business Bureau of, Houston, Tex. (In principle.)
Howard & Barber Co., The, Derby, Conn.
Howards Cleaners, Inc., Pawtucket, R. I. (In principle.)
Hubbard Textile Consulting Bureau, C. C., Silver Spring, Md.
Hunt Co., Robert W., Chicago, Ill.
Ideal Launderers & Dry Cleaners, McCook, Nebr.
Ideal Laundry Co., Spokane, Wash. (In principle.)
Ideal Peerless Laundry Co., Inc., Jamestown, N. Y.
Ideal Troy Dyers, Cleaners, Launderers, Peoria, Ill. (In principle.)
Illinois Institute of Technology, Chicago, Ill.
Industrial By-Products & Research Corporation, Philadelphia, Pa.
International Veiling Co., Clifton, N. J.
Inter-State Dye & Finishing Corporation, Passaic, N. J.
Jelleff, Inc., Frank R., Washington, D. C.
Johnson City Steam Laundry, Inc., Johnson City, Tenn.
Johnson Laundry Co., Albert Lea, Minn. (In principle.)
Jones, Daniel H., Philadelphia, Pa.

Juilliard & Co., Inc., A. D., New York, N. Y.
Julius Klean Klose Shop, Storm Lake, Iowa.
Kansas State College, Manhattan, Kans. (In principle.)
Katz, N. E., Meridian, Miss.
Kendall Mills (Finishing Division of The Kendall Co.), Walpole, Mass.
Kennard, Pyle Co., Wilmington, Del.
Kerr Bleaching & Finishing Works, Inc., Concord, N. C.
Kitterman's Cleaners, Cedar Rapids, Iowa.
Kohler's, Inc., Youngstown, Ohio. (In principle.)
Krout & Fite Manufacturing Co., Philadelphia, Pa.
La Jolla Dry Cleaners, La Jolla, Calif.
Landers Corporation, The, Toledo, Ohio.
Landes Laboratories, Inc., William, New York, N. Y.
Lane Cotton Mills Co., New Orleans, La.
Lansburgh & Bro., Washington, D. C.
Lanza Silk Dyeing Co., Paterson, N. J.
Laucks Laboratories, Inc., Seattle, Wash.
Lavonia Manufacturing Co., Lavonia, Ga.
Lazarus & Co., The F. & R., Columbus, Ohio.
Leeds College of Technology, Leeds, York, England.
Leomar Processing Corporation, Providence, R. I.
Leonard & Co., W. C., Saranac Lake, N. Y.
Levy Bros. Dry Goods Co., Douglas, Ariz.
Lewis Cleaning Co., Hannibal, Mo. (In principle.)
Lewis Laundry & Cleaners, Inc., Louisville, Ky. (In principle.)
Loeb's Laundry-Cleaners, Memphis, Tenn. (In principle.)
Loeser & Co., Inc., Frederick, Brooklyn, N. Y.
Long Beach, Calif., Better Business Bureau of, Long Beach, Calif.
Lord & Taylor, New York, N. Y.
Los Angeles Testing Laboratory, Los Angeles, Calif.
Lovemans, Inc., Chattanooga, Tenn.
Lungstras Dyeing & Cleaning Co., St. Louis, Mo.
Lux Laboratories, The, Cambridge, Mass. (In principle.)
Lymansville Co., Providence, R. I.
Maas Chemical Laboratories, Arthur R., Los Angeles, Calif.
Mabley & Carew Co., Cincinnati, Ohio.
Macy & Co., Inc., R. H., New York, N. Y.
Magnolia Cotton Mill Co., Magnolia, Ark.
Maine Mills Laboratory, Lewiston, Maine.
Maison Blanche Co., New Orleans, La.
Maison Maurice, New Orleans, La.
Manhattan Laundry Co., Washington, D. C.
Manville Jenckes Corporation, Manville, R. I.
Marion Manufacturing Co., Marion, N. C.
Marting Bros. Co., The, Portsmouth, Ohio.
Mary Hardin Baylor College, Belton, Tex.
Mayer Co., Ltd., Gus, New Orleans, La.
McCallum & Robinson, Inc., Memphis, Tenn.
McCreery & Co., James, New York, N. Y.
McCurdy & Co., Inc., Rochester, N. Y.
McCutcheon & Co., James, New York, N. Y.
McLean Co., Andrew, Passaic, N. J.
Merrimack Manufacturing Co., Lowell, Mass.
Methuen International Mills, Methuen, Mass. (In principle.)
Meyers Arnold Co., Greenville, S. C.
Miami Laundry Co., Miami, Fla.
Michigan State College, East Lansing, Mich. (In principle.)
Midland Chemical Laboratories, Inc., Dubuque, Iowa.
Miller & Paine, Lincoln, Nebr.
Miner Laboratories, Inc., Chicago, Ill.
Minnesota, University of, Division of Home Economics, St. Paul, Minn. (In principle.)
Model Cleaning & Dyeing Co., Reading, Pa. (In principle.)
Model Family Laundries, Inc., New Haven, Conn.
Model Laundry Co., Inc., Charlotte, N. C.
Model Laundry & Dry Cleaners, Hutchinson, Kans.
Montgomery Co., The, Windsor Locks, Conn. (In principle.)
Montgomery Ward & Co., Inc., Chicago, Ill.
Montpelier Steam Laundry, Montpelier, Vt.
Moore Co., Harry C., Nevada, Mo.
Munro Dry Cleaning Co., Inc., Beaumont, Tex. (In principle.)
Munsingwear, Inc., Minneapolis, Minn.
Murphy Co., G. C., McKeesport, Pa.
Mutual Laundry Co., The, Topeka, Kans.
Myers Launderers & Cleaners, Ashland, Ohio.
Narragansett Finishing Co., Westerly, R. I.
Nashawena Mills, New Bedford, Mass.
National Retail Testing Bureau, New York, N. Y.

Nebraska, University of, College of Agriculture, Home Economics Department, Lincoln, Nebr. (In principle.)
New City Cleaners, Bakersville, Calif. (In principle.)
New Hampshire, University of, Engineering Experiment Station, Durham, N. H. (In principle.)
New Lafayette Steam Laundry, Inc., Lafayette, La.
New Method Cleaners & Dyers, Denver, Colo.
New Orleans, Inc., Better Business Bureau of, New Orleans, La. (In principle.)
New York Testing Laboratories, Inc., New York, N. Y.
Nickey, Harry W., Springfield, Ill. (In principle.)
Norfolk Testing Laboratories, Inc., Norfolk, Va.
North Carolina State College Textile School, Raleigh, N. C. (In principle.)
North Texas State Teachers College, Denton, Tex.
Nyanza Color & Chemical Co., Inc., New York, N. Y.
Oak Worsted Mills, Philadelphia, Pa.
Ochs Bros., Faribault, Minn.
Oklahoma College for Women, Chickasha, Okla. (In principle.)
Oklahoma Operating Co., Oklahoma City, Okla. (In principle.)
Oregon State College, School of Home Economics, Corvallis, Oreg. (In principle.)
Osborn Cleaners, Owosso, Mich.
Osborne Testing Laboratories, Raymond, Los Angeles, Calif.
Ottawa University, Ottawa, Kans. (In principle.)
Pacific Mills, Print Works Division, Lawrence, Mass.
Pacific Mills, Worsted Division, Lawrence, Mass.
Pantorium, Omaha, Nebr.
Parke Snow, Inc., Waltham, Mass.
Parker, Wilder & Co., New York, N. Y.
Pease Laboratories, Inc., New York, N. Y.
Peck & Peck, New York, N. Y.
Peerless Cleaners, Carbondale, Ill.
Penn Traffic Co., Johnstown, Pa.
Penney Co., Inc., J. C., New York, N. Y.
Penniman & Browne, Baltimore, Md.
Pennsylvania State College, The, State College, Pa.
Pepperell Manufacturing Co., Biddeford, Maine, and Lewiston, Maine.
Perfection Laundry Co., The, Springfield, Ohio.
Petri's Master Cleaners & Dyers, North Adams, Mass.
Pharma Chemical Corporation, Bayonne, N. J.
Pittsburgh Testing Laboratory, Pittsburgh, Pa.
Pittsburgh, University of, Research Bureau for Retail Training, Pittsburgh, Pa. (In principle.)
Pond Lily Co., Plant B, New Haven, Conn.
Powers Dry Goods Co., Inc., Minneapolis, Minn.
Pullar, Robert Taft, New York, N. Y.
Purdue University, Chemistry Department, Organic Division, W. Lafayette, Ind.
Purdue University, School of Home Economics, Lafayette, Ind. (In principle.)
Puritan Piece Dye Works, Paterson, N. J.
Quality Dry Cleaners, Lakeland, Fla.
Quality "Masters" Cleaners, Colorado Springs, Colo.
Rhode Island State College, Kingston, R. I. (In principle.)
Ridley Cleaners, Inc., Detroit, Mich.
Rike Kumler Co., Dayton, Ohio.
Rinso Laboratories, Cambridge, Mass. (In principle.)
Riverside & Dan River Cotton Mills, Inc., Danville, Va.
Robb & Moody, Virginia Testing Laboratory, Richmond, Va.
Roberts Dry Cleaning System, Eureka, Calif. (In principle.)
Robertson Bleachery & Dye Works, Inc., The, New Milford, Conn.
Robinson Co., L. W., Battle Creek, Mich.
Rosenblatt Sons & Co., Inc., A., Philadelphia, Pa.
Ross Cleaners, Columbus, Ohio. (In principle.)
Royer's, Inc., Greensburg, Pa.
Russell Manufacturing Co., The, Middletown, Conn.
Sacramento, Better Business Bureau of, Sacramento, Calif. (In principle.)
Sadtler & Son, Inc., Samuel P., Philadelphia, Pa.
Sage Allen & Co., Hartford, Conn.
Saint-Denis Kuhlmann Saint-Clair Dyestuff Corporation, New York, N. Y.
Saint Louis Sampling & Testing Works, Saint Louis, Mo.
San Souci Co., J. O., Providence, R. I.
Sandoz Chemical Works, Inc., New York, N. Y.
Sandra Frocks, Inc., Steger, Ill.
Sanger Bros., Inc., Dallas, Tex.
Sanitary Laundry, Inc., Pikeville, Ky. (In principle.)
Sanitone Cleaner, Alliance, Nebr.
Santa Fe Electric Laundry, Santa Fe., N. Mex.
Saunders, E. W., Bozeman, Mont.

Sayles Biltmore Bleacheries, Inc., Biltmore, N. C.
Sayles Finishing Plants, Inc., Saylesville, R. I.
Schneierson & Sons, Inc., I., New York, N. Y.
Schramm Co., J. S., Burlington, Iowa.
Schumacher & Co., F., New York, N. Y.
Schumann & Co., Chicago, Ill.
Schwarzenbach Huber Co., New York, N. Y.
Sears, Roebuck & Co., Chicago, Ill.
Shepler's, Inc., Detroit, Mich.
Schulls Dry Cleaning Works, York, Pa.
Sigal & Sons, H. B., Bethlehem, Pa.
Skidmore College, Saratoga Springs, N. Y. (In principle.)
Skinner & Sherman, Inc., Boston, Mass.
Slatersville Finishing Co., Slatersville, R. I.
Smith-Emery Co., Los Angeles, Calif.
Snell, Inc., Foster D., Brooklyn, N. Y.
South Dakota Agricultural Experiment Station, Brookings, S. Dak. (In principle.)
Spiegel, Inc., Chicago, Ill.
Spiess Company, Joseph, Elgin, Ill.
Spurgeon's Cleaning & Dyeing Plant, Sacramento, Calif. (In principle.)
Standard Dyestuff Corporation, Paterson, N. J.
Star Laundry Co., Danville, Va. (In principle.)
Stearns Co., R. H., Boston, Mass.
Stein, Hall & Co., Inc., Charlotte, N. C., and New York, N. Y.
Stifel & Sons, Inc., J. L., Wheeling, W. Va.
Stillman & Van Siclen, Inc., New York, N. Y.
Straka's Joliet Dyers & Cleaners, Joliet, Ill.
Strasburger & Siegel, Baltimore, Md.
Strouss-Hirshberg Co., The, Youngstown, Ohio.
Stunzi Sons Silk Co., Inc., New York, N. Y.
Suncook Mills, Suncook, N. H.
Syracuse University, College of Applied Science, Syracuse, N. Y. (In principle.)
Texas Technological College, Textile Engineering Department, Lubbock, Tex. (In principle.)
Textile Testing & Research Laboratories, New York, N. Y.
Textiles Education Bureau, New York, N. Y.
Thies Dyeing Mills, Inc., West Warwick, R. I.
Thurkauf's Sons, Virgil, New York, N. Y. (In principle.)
Thurston Cutting Corporation (Testing Laboratory), New York, N. Y.
Tip Top Cleaners, Springfield, Mass.
Triplewear Brake Linings Co., Paterson, N. J.
Troy, The, Casper, Wyo.
Troy Dry Cleaning Co., Fort Wayne, Ind.
Troy Laundry Co., Cedar Rapids, Iowa.
Troy Laundry Co., Port Huron, Mich.
Troy-Pearl Laundry Co., The, Dayton, Ohio.
Tubize Chatillon Corporation, New York, N. Y. (In principle.)
Tufts College, Medford, Mass.
Twin City Dry Cleaning Co., Winston-Salem, N. C.
Twining Laboratories, The, Fresno, Calif.
Union Bleachery, Greenville, S. C.
Uniset Group, Brooklyn, N. Y. (In principle.)
United States Finishing Co., The, Norwich, Conn.
United States Testing Co., Inc., Hoboken, N. J. (In principle.)
University Cleaners, Norman, Okla.
Vermont Cleansing Co., Burlington, Vt.
Virginia, State Dry Cleaners Board of, Staunton, Va.
Wallis Cleaning Service, Tucson, Ariz.
Wamsutta Mills, New Bedford, Mass.
Wardrobe, The—Dry Cleaners, Ottumwa, Iowa.
Warren Featherbone Co., The, Three Oaks, Mich.
Wausau Laundry & Cleaners Co., Wausau, Wis.
Weems Laundry Co., Quincy, Ill.
Weiner Co., Martin, Clifton, N. J.
Weinstock, Lubin & Co., Inc., Sacramento, Calif.
Welek & Co., Inc., Chas. F., Saint Louis, Mo.
Wellington Sears Co., New York, N. Y.
Western Precipitation Corporation, Los Angeles, Calif.
Whitaker & Sons, Wm., Philadelphia, Pa.
White Star Laundry & Dry Cleaning Co., Parkersburg, W. Va.
Wieboldt Stores, Inc., Chicago, Ill.
Willingham Cotton Mills, Macon, Ga.
Winkler, Adolph J. (The Standard Testing Bureau), New York, N. Y.
Winona Cleaning Works, Winona, Minn.
Woodlawn Finishing Co., Pawtucket, R. I.
Wyoming, University of, Laramie, Wyo. (In principle.)
Yates Bleachery Co., Flintstone, Ga.
Yeager Co., The C. H., Akron, Ohio.
Yorgey's Cleansers & Dyers, Reading, Pa.
Zenith Cleaning Co., Dallas, Tex. (In principle.)

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2-30.	Mopsticks.
3-40.	Stoddard solvent (third edition).
4-29.	Staple porcelain (all-clay) plumbing fixtures.
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44-32.	Apple wraps.
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61-37.	Wood-slat venetian blinds.
62-38.	Colors for kitchen accessories.
63-38.	Colors for bathroom accessories.
64-37.	Walnut veneers.
65-38.	Wool and part-wool fabrics.
66-38.	Marking of articles made wholly or in part of platinum.
67-38.	Marking articles made of karat gold.
68-38.	Liquid hypochlorite disinfectant, deodorant, and germicide.
69-38.	Pine oil disinfectant.
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71-41.	Phenolic disinfectant (soluble type) (second edition) (published with CS70-41).
72-38.	Household insecticide (liquid spray type).
73-38.	Old growth Douglas fir standard stock doors.
74-39.	Solid hardwood wall paneling.
75-39.	Automatic mechanical draft oil burners.
76-39.	Hardwood interior trim and molding.
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84-41.	Electric tail lamps for vehicles (after market).
85-41.	Electric license-plate lamps for vehicles (after market).
86-41.	Electric stop lamps for vehicles (after market).
87-41.	Red electric warning lanterns.
88-41.	Liquid-burning flares.
89-40.	Hardwood stair treads and risers.
90- .	(Reserved for power shovels and cranes.)
91-41.	Factory-fitted Douglas fir entrance doors.
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98-41.	Portable electric drills (exclusive of high frequency).

NOTICE.—Those interested in commercial standards with a view toward accepting them as a basis of everyday practice may secure copies of the above standards, while the supply lasts, by addressing the Division of Trade Standards, National Bureau of Standards, Washington, D. C.

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